WE CLAIM:

1. A turbine shroud assembly comprising:

a plurality of shroud segments assembled circumferentially about a longitudinal engine centerline axis, at least one shroud segment having a forward hook and an aft hook;

at least one spacer channel positioned on the radially outward side of said shroud segments, such that said at least one spacer channel is in contact with an interface of two said shroud segments;

at least one ceramic spacer seal positioned in contact with said at least one spacer channel, such that said at least one ceramic spacer seal is within said at least one spacer channel;

at least one forward hanger positioned radially outward from said shroud segments, said at least one forward hanger having a forward hanger rail capable of engaging said forward hook, said forward hanger rail having an o-ring groove positioned circumferentially on a radially inward side;

at least one aft hanger positioned radially outward from said shroud segments, said at least one aft hanger having an aft hanger rail capable of engaging said aft hook, said aft hanger rail having an angled surface positioned on the forward edge of a radially inward side; and

a plenum assembly positioned between and in contact with said at least one forward hanger and said at least one aft hanger.

2. The turbine shroud assembly of claim 1, further comprising a forward rope seal positioned between and in contact with said o-ring groove and said shroud segments.

3. The turbine shroud assembly of claim 1, further comprising an aft rope seal positioned between and in contact with said angled surface and said shroud segments.

4. The turbine shroud assembly of claim 3, wherein said aft rope seal comprises a hybrid ceramic rope.

5. The turbine shroud assembly of claim 1, wherein said shroud segments comprise a monolithic silicon nitride ceramic.

6. The turbine shroud assembly of claim 1, wherein said at least one forward hanger comprises a nickel based alloy.

7. The turbine shroud assembly of claim 1, wherein said at least one aft hanger comprises a nickel based alloy.

8. The turbine shroud assembly of claim 1, wherein said at least one forward hanger has a plurality of slots positioned at an inner diameter and extending radially outward.

9. The turbine shroud assembly of claim 1, wherein said at least one ceramic spacer seal comprises a monolithic silicon nitride ceramic.

10. The turbine shroud assembly of claim 1, further comprising a thermal barrier coating (TBC) positioned on a radially inward side of said shroud segments.

11. A turbine shroud assembly comprising:

a plurality of ceramic shroud segments assembled circumferentially about a longitudinal engine centerline axis, each said ceramic shroud segment having a forward hook and an aft hook; and

a plurality of ceramic spacer seals positioned in contact with said ceramic shroud segments, such that each one said ceramic spacer seal is in contact with the radially outward side of two said ceramic shroud segments.

12. The turbine shroud assembly of claim 11, further comprising a forward hanger radially outward from and engaging said forward hook, and comprising an aft hanger radially outward from and engaging said aft hook.

13. The turbine shroud assembly of claim 12, further comprising a forward rope seal positioned between said ceramic shroud segments and said forward hanger such that said forward rope seal is radially inward from said forward hanger.

14. The turbine shroud assembly of claim 12, further comprising an aft rope seal positioned between said ceramic shroud segments and said aft hanger such that said aft rope seal is radially inward from said aft hanger.

15. A turbine shroud assembly comprising:

a plurality of shroud segments assembled circumferentially about a longitudinal engine centerline axis, each said shroud segment comprising a monolithic silicon nitride ceramic and having a shroud segment forward hook and a shroud segment aft hook;

a plurality of spacer channels positioned on the radially outward side of said shroud segments, such that one said spacer channel is in contact with each interface of two said shroud segments;

a plurality of ceramic spacer seals comprising a monolithic silicon nitride ceramic, said ceramic spacer seals positioned in contact with said spacer channels, such that one said ceramic spacer seal is within each said spacer channel;

a forward hanger comprising a nickel based alloy, positioned radially outward from said shroud segments, said forward hanger having a hanger rail capable of engaging said shroud segment forward hooks, said forward hanger rail having an o-ring groove positioned circumferentially on a radially inward side;

a forward rope seal positioned between and in contact with said o-ring groove and said shroud segments;

an aft hanger comprising a nickel based alloy, positioned radially outward from said shroud segments, said aft hanger having an aft hanger rail capable of engaging said shroud segment aft hooks, said aft hanger rail having an angled surface positioned on the forward edge of the radially inward side;

an aft rope seal positioned between and in contact with said angled surface and said shroud segments;

a plenum assembly positioned between and in contact with said forward hanger and said aft hanger, said plenum assembly comprising an axisymmetric plenum balloon having an impingement cooling array there through, a plurality of flow metering openings in fluid communication with said axisymmetric plenum balloon, and a plurality of inlet openings in flow

communication with said flow metering openings.

16. An apparatus for a turbine engine comprising:

an axisymmetric plenum balloon having an impingement cooling array there through;

a plurality of flow metering openings in fluid communication with said axisymmetric plenum balloon; and

a plurality of inlet openings in flow communication with said flow metering openings.

17. The apparatus of claim 16, wherein said impingement cooling array comprises a plurality of forward hanger cooling impingement openings, a plurality of aft hanger cooling impingement openings, and a plurality of shroud cooling impingement openings.

18. The apparatus of claim 16, wherein a cross-sectional area of said inlet openings is at least about three times a cross-sectional area of said flow metering openings.

19. The apparatus of claim 16, wherein said axisymmetric plenum balloon comprises a sheet metal form.

20. The apparatus of claim 16, wherein said turbine engine has a plurality of shroud segments, and said axisymmetric plenum balloon follows a contour of a radially outward side of said shroud segments.

21. The apparatus of claim 16, wherein said inlet openings are radially outward from said axisymmetric plenum balloon.

22. The apparatus of claim 16, further comprising a vertical flange

positioned radially outward from and aft of said inlet openings.

23. A rope seal apparatus for use between a turbine shroud and a turbine hanger comprising a compressed hybrid ceramic rope positioned between and in contact with said turbine shroud and said turbine hanger, such that said turbine hanger is radially outward from said compressed hybrid ceramic rope.

24. The rope seal apparatus of claim 23, wherein said turbine hanger comprises a forward hanger having a circumferential o-ring groove positioned on a radially inward side, and said compressed hybrid ceramic rope is in contact with said circumferential o-ring groove.

25. The rope seal apparatus of claim 23, wherein said turbine hanger comprises an aft hanger having a circumferential angled surface positioned on a forward edge of the radially inward side, and said compressed hybrid ceramic rope is in contact with said angled surface.

26. The rope seal apparatus of claim 23, wherein said turbine shroud comprises a plurality of ceramic shroud segments.

27. A method of shielding a turbine engine from a hot gas flow path there through comprising the steps of:

providing a plurality of ceramic shroud segments assembled circumferentially about a longitudinal engine centerline axis through said hot gas flow path, a forward hanger radially outward from and forward of said ceramic shroud segments, an aft hanger radially outward from and aft of said ceramic shroud segments, and a plenum assembly between and in contact with said forward hanger and said aft hanger; and

supplying a cooling flow to said plenum assembly such that said cooling flow impinges said ceramic shroud segments, said forward hanger, and said aft hanger.

28. The method of claim 27, further comprising a step of positioning a hybrid rope seal between said forward hanger and said ceramic shroud segments.

29. The method of claim 27, further comprising a step of positioning a hybrid rope seal between said aft hanger and said ceramic shroud segments.

30. The method of claim 27, further comprising a step of positioning a ceramic spacer seal in contact with a radially outward side of each interface of two ceramic shroud segments.

31. The method of claim 30, wherein said ceramic spacer seals comprise a monolithic silicon nitride ceramic.

32. The method of claim 27, wherein said plenum assembly comprises an axisymmetric plenum balloon having an impingement cooling array there through, a plurality of flow metering openings in fluid communication with said axisymmetric plenum balloon, and a plurality of inlet openings in flow communication with said flow metering openings.